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ABSTRACT

This paper discusses current issues regarding assistive technology devices and services, especially in relation to the roles and responsibilities of the rehabilitation psychologist. Following an introductory section which defines an assistive technology device and an assistive technology service, the following sections discuss: (1) past developments and current trends--increasing use of microprocessors, more health care delivery in the home, and movement from the medical model of rehabilitation to a social model; (2) the impact of assistive technology on quality of life--there have been few studies on this topic; and (3) needs of older users of assistive technology--there may be discomfort and lack of understanding of technology by the user or caretaker. The final section offers practical suggestions for rehabilitation psychologists when assessing characteristics and preferences of the person with a disability, when assessing the context, when assessing activities and desired features of technologies, and when assessing outcomes of assistive technology device and service utilization. Also included are suggestions for obtaining training in assistive technology. Two attached tables offer examples of assistive technologies within major product categories and a classification of complexity of assistive technologies for personal care. (Contains 12 references.) (DB)

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# Assistive Technology: Issues and Trends

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# Assistive Technology: Issues and Trends

by Marcia J. Scherer, Ph.D., MPH, CRC

Each of us is a regular user of technology. Such items as can openers, computers, telephones, dryers, remote controls, shopping carts, calculators, luggage carts, ramps, and power doors are all examples of assistive devices that help people get through their day with less difficulty. Individuals with disabilities use these and other specialized technologies (assistive technology devices) to maximize independent functioning , increase mobility, help with communication , and increase school and career success and job-related abilities. Even very young children in early intervention programs are using simple switches at the age of eighteen months. By kindergarten they are accessing VCRs and computer games.

As the available features and options of assistive technologies (AT) have increased, their use has been more widely considered and recommended. Every piece of Federal legislation enacted during the past ten years regarding persons with disabilities has explicitly referred to assistive technology devices and services. The legislation has covered the lifespan from childhood (for example, IDEA) to adulthood (for example, ADA). Regardless of the Act, the definitions of assistive technology devices and services used are the ones first set out in the 1988 Technology Related Assistance for Individuals with Disabilities Act (known popularly as "the Tech Act" which was reauthorized in 1998 as the assistive technology act or ATA). An assistive technology device was defined as:

> any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

An assistive technology service is:

> Any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device, including... evaluation of the needs of an individual...; Purchasing, leasing, or otherwise providing for the acquisition by an individual with a disability of an assistive technology device; Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing assistive technology devices; ...Training and technical assistance...

The definitions above cover a very wide range of devices and services and over the past ten years have generated a number of activities and initiatives. Technical advancements have increased the usability of technologies, improved components and materials, and generally contributed to overall consumer functional independence. Improvements will continue, as will legislative efforts regarding the funding and availability of technologies. This paper discusses some of the current issues regarding assistive technology devices and services -- all of which can impact the roles and responsibilities of the rehabilitation psychologist.

Past Developments and Current Trends

Since the microprocessor became available (and affordable) computers were suddenly small enough to be included in such consumer products as microwave ovens and automobiles. "High tech" devices of many types were now possible, and this meant that persons with severe functional limitations could lead more independent lives in their homes and communities. Today, computer chips are included in reading machines for persons who are blind, sophisticated power wheelchairs for those with mobility needs, augmentative communication devices with synthesized speech output for individuals with speech disabilities, and environmental control devices for those with upper extremity limitations who need assistance in operating household appliances. Today, there are more than 22,000 different assistive technology devices available – making the process of choosing the most appropriate device for a particular user more complex and time-consuming (Galvin & Scherer, 1996).

As shown in Table 1, ATs assist individuals in all major areas of life functioning. Generally speaking, the more severe an individual's disability, the more complex the AT needs to be in order for that person's function to be assisted. Examples of this are provided in Tables 2 and 3.

The microprocessor also meant healthcare technologies could be smaller, more portable, and affordable. Such treatments as kidney dialysis can now be done in the home. Implantable and self-injecting devices for medications are possible, as well as x-ray systems small enough to go into the home. With the right equipment, a doctor in one location can now examine and converse with a patient 100 miles away or more.

At this point, related trends became widespread: managed care (and the need to get patients out of hospitals more quickly) and the delivery of healthcare in the home. This move from the hospital to the home put more of an emphasis on respiratory therapists, physical and occupational therapists, and home healthcare dealers/suppliers as the providers of care in the home and essential patient instruction.

Persons equipped with AT can now lead more independent lives, and more people with disabilities live in their communities, attend regular schools, and succeed in professional careers. This evolution has brought a plea for AT users to move away from the *medical model* of rehabilitation to a *social model*. Persons with disabilities want as much emphasis placed on their community (re)integration as on their physical capabilities. Thus, there is as much need to change and accommodate the environment as equip the person Scherer, 1996b).

The Impact of Assistive Technology on Quality of Life

As rehabilitation psychologists, we are concerned about the quality of life (QOL) of individuals with disabilities and how ATs affect QOL. QOL has been described as life satisfaction, subjective well-being and a positive general affect. In addition to these global constructs, it is associated with satisfaction in specific areas of life such as work, social relationships, and being able to go where one wishes beyond the mere physical capability to do so (Scherer, 1996a). It has been studied by looking at subjective reports along with such objective indicators as sociodemographic and medical factors, functional impairment, and ability to work. Today, it is a common view in rehabilitation that the perspectives individuals with disabilities have regarding their quality of life is more relevant than

objective indicators of this construct, since individuals may be quite positive about their life circumstances even though they might appear bleak according to objective measures.

While there have been many recent studies of the subjective well-being and QOL of individuals with spinal cord injuries in the rehabilitation literature, with the tendency for these terms to be used synonymously (e.g. Krause, 1998; Dijkers, 1998; Fuhrer, 1996), there have been comparatively few studies with a focus on assistive technologies (which can contribute significantly to perceived quality of life) and their relationship to quality of life (Cushman & Scherer, 1996; Galvin & Scherer, 1996; Jutai, 1999; Scherer, 1996a).

Where are We Headed in the Future?

Children and young persons with disabilities may rarely need to receive healthcare and rehabilitation outside their homes or community-based programs. At the other end of the lifespan, older persons who, as they age, become more frail and develop more limitations in function, are able to stay in their homes longer.

Among persons who use any assistive devices, the majority are over 65, reflecting the higher prevalence of impairments in that population. The push to keep aging persons home and out of hospitals or nursing care facilities for as long as possible means that more and more technology will continue to enter American homes. Many of these individuals, however, show an aversion to replacing more and more interpersonal interactions with technical functions. Some crucial considerations in the beginning stages of matching an aging person with technology are as follows (Scherer, 1996b):

1. Knowledge of and comfort with technology. Aging women in particular were not brought up to feel comfortable with and knowledgeable about machines and technical

devices. It will be important to find out what technologies the person is already using and try to present new technologies that are similar in operation and which fit seamlessly into the user's accustomed routine.

2. Family members and other caretakers who devote a major portion of their day to the care of a person with a disability may feel overwhelmed by the heightened need for medical and technological interventions. They will need to have more exposure to and thorough training in the use of technologies.

3. Aging persons with disabilities undergo changes in their physical capabilities and general health that require modifications in devices and heightened attention to their special needs. Rehabilitation Psychologists will be helpful in the identification of changes and ways to address functional declines and the preservation of as much previous functioning as possible.

4. When there is a need to accommodate changes in an individual's functioning, dollars have to be spent either by that person and family or by an agency. But when the home environment is designed to grow with and adapt to the changing needs of its inhabitants, the necessary dollar expenditure can be reduced. Examples of adaptable features are:

- a bathroom with studs in the right places for the later installation of grab bars
- removable kitchen cabinets to allow a wheelchair to slide up to the counters
- vertically arranged closets to accommodate the later installation of an elevator.

*Universal design* ideally results in environments and products that are usable by everyone, and thus, their relevance to and usability by persons with disabilities is assumed and is as invisible as possible. Assistive technologies, on the other hand, tend to be products that are designed from the outset to enhance the functional activities of persons with

disabilities. When an environment cannot be modified easily or cost-efficiently, when individuals live in dispersed neighborhoods, the least costly alternative may be a combination of universal design and assistive technology. The purpose of *both* universal design and assistive technology is to enable individuals to fully participate in all of life's activities regardless of capability or ability. The Rehabilitation Psychologist of the future could benefit tremendously from learning about universal design and ways to make homes and products widely accessible.

Today, there is a such a wide variety of available assistive technology devices (over 22,000) that selecting the most appropriate one for any given user – regardless of age --requires a process in itself. At its most fundamental level, assistive technology systems represent someone (a person with a disability) doing something (an activity) somewhere (within a context).

Tips for Rehabilitation Psychologists when Assessing Characteristics and Preferences of the Person with a Disability. Individuals vary in their attraction to AT use (Demers, Weiss-Lambrau & Ska, 1996) and their psychological readiness for use (Elliott & Umlauf, 1995; Scherer, 1992). As we strive to individualize rehabilitation services, help people with disabilities achieve their self-determined goals and include them in all aspects of community and society, it is imperative that professional and consumers work together. To do this effectively, perspectives need to be openly shared and discussed. To keep the focus on the user of these products and services, rehabilitation psychologists will play a key role in assessing user preferences and predispositions to the use of particular technologies and assessing the outcomes of products and services provided.

The guiding premise in rehabilitation will be that disability is not a reflection or result of an individual's developmental or medical condition, but arises from the collective human condition. Therefore, rehabilitation must address societal (or social) and cultural views of disability as well as the personal meaning (or construction) of disability. We will continue to evolve from *normalization* (persons with disabilities should strive to be like non-disabled persons) to *empowerment* (persons with disabilities have the right to be self-determining and to make their own choices about their lives and to achieve the quality of life each believes is personally best). A key aspect of rehabilitation in the future will be the full involvement of persons with disabilities in the field's research and writings; what we have termed *participatory action research.*

Tips for Rehabilitation Psychologists when Assessing the Context. In situ trials of equipment that involve everyone affected by the assistive technology have proven to be cost effective in the long term because obstacles to optimal technology use are identified before "bad habits" can form. When trials are videotaped, everyone involved can then participate in identifying solutions to potential obstacles to optimal technology use.

Tips for Rehabilitation Psychologists when Assessing Activities and Desired Features of Technologies. An assistive technology is abandoned when it is perceived as not being worth the effort required to set it up and operate it, is never there when needed, and is costly or inconvenient to maintain. Selecting the most appropriate technology with all the right features is best done in partnership with the user (Scherer & Galvin, 1996; Scherer, 1994). A technology must have enough features to be useful and expandable, but not so

many that the user becomes overwhelmed. Overload is a concern when an individual already uses or is being matched with more than one technology. Multiple technology use can bring overload of many types -- power, cognitive, and willingness to tolerate technical assistance.

Tips for Rehabilitation Psychologists when Assessing the outcomes of Assistive Technology Device and Service utilization. Professionals working with assistive technologies need to demonstrate that what they do makes a difference in the lives of persons with disabilities. Insurance companies and other payors are increasingly asking for documentation showing the effectiveness of all assistive technology services -- also known as "quality assurance." A major part of quality assurance is being able to assess and document outcomes of an intervention. One means of assessing change to have the individual prioritize his or her desired outcomes and then rate over time progress in achieving them. This is the system used in the Matching Person and Technology assessments (Scherer, 1994) and they have been shown to be effective (Scherer & Frisina, 1998; Vincent& Morin, 1999). The three primary areas assessed are as follows: (a) Determination of the milieu/environment factors influencing use, (b) identification of the consumer's needs and preferences, and (c) description of the functions and features of the most desirable and appropriate technology. In this system, outcomes are measured in terms of changes in, for example, the person's satisfaction in being able to get to where they want to go, whether by walking or some other means, rather than just by the functional capability to do so.

Summary and Conclusions

This paper has outlined some beginning guidelines and areas to consider. For the Rehabilitation Psychologist interested in more in-depth study, there are now many courses (even entire degree programs) available in assistive technology. Check with the college or university closest to you to see what is available in your area. There are also for credit courses available on-line (that is, through distance learning). For example, the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) offers a course, *Fundamentals in Assistive Technology*. RESNA also offers a credentialing program for assistive technology practitioners and for suppliers. For further information, contact RESNA in Arlington, Virginia at 703/524-6686. Another option for coursework in assistive technology is to take the two-week training offered through the Center on Disabilities, California State University, Northridge. This course will earn the student a Certificate in Assistive Technology Applications and 10 CEUs. For further information, contact the Center on Disabilities at 818/677-2578.

Assistive technology is a field for the future. The Rehabilitation Psychologist who is enthusiastic about maximizing the potential of individuals with disabilities will benefit tremendously by obtaining a good working knowledge of the many varieties of assistive technology products and services involved. By becoming a specialist in assistive technology, the Rehabilitation Psychologist can become a resource to other Rehabilitation Psychologists and colleagues, consumers who wish to partner in the process of technology selection and acquisition, and a variety of community agencies.

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# Table 1: Examples of Assistive Technologies within Major Product Categories*

## Recreation

Products in this category enable persons to participate in social activities, team sports, and other forms of indoor and outdoor recreation

- Adapted games
- Gardening aids

## Sensory Disabilities

Devices in this category assist persons with vision and/or hearing loss

- tactile and auditory mobility aids
- signaling devices
- sound amplification systems

## Communication

Products for communication center on the ability to send and receive messages in spoken and written form

- adapted telephones
- typing aids
- writing aids

## Personal Care

These devices enable independence in such fundamental areas as grooming, bathing, dressing, eating and accessing home appliances.

- eating utensils with angled or built-up handles
- razor holders
- reachers
- non-slip placemats under dinner plates
- bath sponges
- book holders
- transfer boards

## Mobility

Devices in this category provide support for persons to get around in their environments of choice.

- walkers
- canes
- crutches
- manual and power wheelchairs, scooters

* These product categories represent only a partial list from the ABLEDATA classification system. ABLEDATA is a compilation of over 22, 000 assistive devices organized by functional activities.

## Table 2: Complexity of Assistive Technologies for Personal Care

| Extent of functional limitation | Complexity of Devices for Personal Care | | |
|---|---|---|---|
| | low-tech | med-tech | high-tech |
| mild | adapted eating utensils, bath sponge, non-slip placemat | | |
| moderate | | touch lamp | adapted telephones |
| severe | | | Environmental control device |

From Scherer (1996)

## Table 3: Complexity of Assistive Technologies for Mobility

| Extent of functional limitation | Complexity of Devices for Mobility | | |
|---|---|---|---|
| | low-tech | med-tech | high-tech |
| mild | Single foot cane, axillary crutch | | |
| moderate | | Forearm crutches, rolling walkers, manual wheelchairs | Manual wheelchairs with add-on power units |
| severe | | | Powered wheelchairs and scooters |

From Scherer (1996)